

# THE MINERAL INDUSTRY OF MONGOLIA

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Mongolia is a landlocked country that is bordered by China to the south and Russia to the north. It has one of the lowest population densities in the world; the population is about 2.5 million, and the total land mass is about 1.6 million square kilometers. About 30% of the total population lived in the capital city of Ulaanbaatar, another 30% resided in the Central region, and 18% of the population lived in the West region; the South and East regions were sparsely populated and accounted for the remaining 32%. Although the country continued its economic growth of the past several years, poverty remained persistent in rural and urban areas. In 2004, the country's economic growth rate was 10.6%, which was the highest rate since Mongolia's economic transition began in 1991; this growth rate was higher than the 9.5% growth rate in China. Higher mineral prices in the international markets and mild weather in 2004 had a positive impact on the growth (Mongolian News, 2005<sup>1</sup>).

Ulaanbaatar was the center of the country's economic and industrial growth. About 50% of Mongolia's gross domestic product (GDP) of \$1.5 billion and 30% of the country's industrial output was attributed to economic activities in Ulaanbaatar. The mineral sector contributed about 17.3% of the GDP. Mongolia's economy was expected to continue to grow in the next couple of years; future growth was contingent on weather and commodities prices. The manufacturing and mining sectors were expected to be the main contributors to this growth. The Government set the per capita income target at \$716 in 2006 from \$440 in 2001 (Asian Development Bank, 2004).

Since the 1990s, the Asian Development Bank and the World Bank have provided loans and assistance to the Mongolian Government to promote the development of a sound financial sector to support private-sector-led growth. The Ministry of Finance plans to submit a revised taxation law to the Parliament for approval in 2005. The amendments will change personal and corporation income taxes and value-added taxes. The revised law is intended to eliminate double taxation, to minimize the tax burden, and to reduce taxes. Corporate income tax will be reduced to one category, 25% of total income from 30% and 15% depending on earned income. The changes are based on the recommendation by the International Monetary Fund. Domestic and foreign investors are concerned that the tax reform could increase the tax burden and damage foreign investment (UB Post, 2005d§).

A group of Parliamentary representatives submitted proposed mineral law amendments to the Speaker of the Parliament. The current mineral law was adopted in 1997 and amended in 2001. The bill recommended an increase in the minerals royalty to 15% from 2.5%, a doubling of the license fee, and an added export customs tax on mining products. The bill also proposed to reduce tax incentives for mining. Under the current mineral law, companies receive 100% tax exemption for the first 5 years of operation followed by 50% in the next 5 years. The proposed bill will reduce the 100% tax exemption for the first 2 years followed by 50% in the next 3 years. The duration of exploration licenses will be changed to 2 years with a discretionary extension of 3 years with the option of a 2-year extension. The group suggested that the proposed changes would provide more opportunity to local companies without damaging the support for foreign investment (UB Post, 2005a§).

Mongolia has extensive and largely untapped mineral resources. Owing to poor infrastructure, only about 15% of the total area has been geologically mapped. In 2005, the Government planned to invest \$54.5 million in infrastructure development. The mining sector was expected to play an important role in the country's future economic development. The Government adopted several long-term programs to explore for and develop metallic and nonmetallic minerals, such as coal, copper, fluorspar, gold, oil, and silver. The Government also encouraged foreign investment and participation in exploration, exploitation, and processing of minerals. Mining accounted for about 30% of the country's industrial output and 60% of its export revenue. In 2004, a total of \$100 million was spent on exploration in Mongolia, mainly by the private sector (Mongolia Development Gateway, 2005d§; UB Post, 2005b§).

The country's trade has been heavily influenced by economic developments in China and Russia. In 2004, Mongolia's total trade increased by 31.6% to \$1.86 billion. Because of high global metal market prices, the value of exports increased by 38.5% to \$853.3 million. Owing to an increased demand for agricultural products, the value of imports increased by 26.3% to \$1.01 billion. The value of metal and mineral exports and imports accounted for about 57.5% of the country's total trade value. Mongolia exported nearly all its output of copper concentrates and molybdenum concentrates to China and fluorspar was shipped to Japan and Russia. Petroleum and petroleum products remained the leading imported commodities followed by textiles and flour. Mineral exports from Mongolia were expected to increase in the next couple of years. A copper smelter and a zinc plant were scheduled to be put into operation in 2005 and 2006, respectively. China and Russia were Mongolia's two major trading partners. China accounted for 47.8% of Mongolia's total export value, and the United States 17.9%. Russia was Mongolia's leading exporter; it accounted for 33.3% of the total imported value followed by China with 25.1% (Ministry of Industry and Trade, 2005).

The leading mining operation in Mongolia, Erdenet Mining Corp., maintained its mining output of more than 25 million metric tons per year (Mt/yr) of ore and produced concentrates that contained more than 130,000 metric tons (t) of copper and 1,500 t of molybdenum. Because of the decline in the average ore grade, the output of copper and molybdenum in concentrates decreased to 130,000 t and 1,141 t, respectively. Erdenet (49% shares) and Samsung Corp. of the Republic of Korea (51% shares) formed a joint-venture to build a 25,000-metric-ton-per-year (t/yr) copper cathode plant that would use Outokumpu's solvent extraction-electrowinning technology at Erdenet. Capital investment was estimated to be \$70 million. The construction of the plant began in 2004 and was scheduled to start production in 2005. Outokumpu Group of Finland signed a memorandum of understanding (MOU)

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<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

with Erdenet to build a 35,000-t/yr copper rod plant; Outokumpu's HydroCopper process would be used for low-grade copper concentrates. Erdenet and Outokumpu were considering the formation of a joint-venture company (Erdenet Mining Corp., 2005\$).

Erdenet (30% shares) and Metal-Tech Ltd. of Israel (70% shares) established the joint-venture company Shim Technology Ltd. to build a \$23.85 million molybdenum plant. The plant will produce ammonium perrenate, molybdenum trioxide, and molybdenum products. The construction of the plant began in 2004 and was expected to be completed in 2005. Erdenet also planned to build a 50,000-t/yr copper cathode plant with Bateman Engineering Pty Ltd of Australia (Erdenet Mining Corp., 2005\$).

Ivanhoe Mines Ltd. continued to work on its Oyu Tolgoi (Turquoise Hill) project at Oyu Tolgoi, Umnogovi Aimag (Umnogovi Province), in the southern Gobi. AMEC Engineering and Consulting Services of Canada estimated that the measured and indicated resources at Oyu Tolgoi were 1,060 million metric tons (Mt) at average grades of 0.47% copper and 0.36 gram per metric ton (g/t) gold based on a 0.3% copper-equivalent cutoff grade from surface to 560 meters (m) depth and a 0.6% copper-equivalent cutoff below 560 m (Mining Journal, 2004). Ivanhoe completed the feasibility study for the development of two gold-rich open pits in the southwestern and central deposits at Oyu Tolgoi and planned to develop the project in two stages. During the first stage, the company would build a 20-Mt/yr ore concentrator mill to produce 245,500 t/yr of copper in concentrates. Gold production was expected to be 12.5 t/yr. Initial capital investment was estimated to be \$529 million. The mine was expected to begin production in 2007. During the second stage, the company would expand ore output capacity to 40 Mt/yr by developing the open pit and underground mine at Hugo North. The Oyu Tolgoi project was projected to have the capability to sustain ore output of 40 Mt/yr for 25 years. The company planned to build its own smelter, refinery, and powerplant (Metal Bulletin, 2005).

Ivanhoe announced that the company had discovered four significant copper-gold deposits, which are located about 140 kilometers (km) northwest of Oyu Tolgoi, in the area that was named Bronze Fox District. The Bronze Fox District comprises four auriferous porphyry targets—Bronze Fox, East Fox, West Fox, and Tourmaline Hills; these occur with a 14-km-long corridor of alteration and mineralization that is associated with monzodiorite to granodiorite intrusion. Besides copper and gold, significant amounts of arsenic and molybdenum were found (Ivanhoe Mines Ltd., 2004).

Gold mining in Mongolia increased significantly during the past decade, and the number of companies engaged in gold mining grew in the 1990s to more than 100 and produced a total of more than 12 t of gold. Because most of the companies were placer gold producers and many placer deposits were nearly depleted, gold output decreased in the early 2000s. In 2004, a number of gold mines were under development. Gold mines at Borro, Bumbat, and Olon Ovoot were put into operation. Gold output increased sharply and was expected to continue to increase in the near future. Domestic gold demand was mainly for jewelry. More than 90% of total output was exported mainly to China. Before 2002, gold producers were required to sell their output at a fixed price to the Mongol Bank, which paid the producers in foreign currency for up to 50% of gold prices. Since 2002, to encourage gold mining, the Mongol Bank started to buy gold from individual gold producers at the world market prices as for entities and companies. Recently, the Government allowed some gold producers and commercial banks to export gold. Because of climate and environment, gold excavation in Mongolia is not a year-long operation. The volume of gold sold to the Mongol Bank reached its highest level in June and fell slightly in July because of the Naadam national holiday and rose again in August. After August, the volume declined. In 2004, the Mongol Bank purchased 11.6 t of gold from local producers, and gold producers sold and exported about 7.5 t of gold directly to other buyers (Mongolia Development Gateway, 2005b\$).

On March 1, the first hard-rock gold mine Boroo Gold Mine, which was operated by Boroo Gold Company, began operation. Boroo Gold was owned by AGR Ltd. of Australia (95%) and Mongolian Altai Trading Co. (5%). In March 2002, Cameco Gold Inc. (CGI) acquired a 52% interest in AGR. Under the purchase agreement, CGI would oversee the construction, and AGR would operate the mine. Boroo Gold was owned by Centerra Gold Inc. of Canada, in which Cameco retained a controlling interest. The total capital cost for the development of the mine was \$75 million. The mine is located in Bayangol district, Selenge Province, about 110 km north of Ulaanbaatar. The mine had gold reserves of 44 t of gold and a mine life of 8 years. Annual gold output was about 5 t (Mongolian News, 2004\$).

In 2004, Entree Gold Inc. of Canada continued exploration at the Blue Springs, the Rich Gobi, the Shivee Tolgoi (Lookout Hill), the Virgin, and the White Hills concessions. The Shivee Tolgoi encompassed a total area of 179,594 hectares and was completely surrounded by Ivanhoe's Oyu Tolgoi prospect. The Temuujin prospect was at the 216,000-hectare Virgin property in the inferred northeastern extension of the South Gobi porphyry copper-gold belt near to the Trans-Mongolia railway and China. Surface grab sampling showed up to 4.04% copper and 1.2 g/t gold from the Temuujin II area. The drilling program was expected to continue in 2005. The Blue Springs property is located in central Mongolia. Detailed geophysical surveys, mapping, and trenching have been completed. The company identified new mineralized zones on the Blue Springs property. Samplings from the central zone had average grades of 15.2 g/t gold, 68.6 g/t silver, and 1.85% copper. The company planned to continue to conduct sample analyses and geochemical and geophysical surveys of the property during 2005 (Entree Gold Inc., 2004).

Solomon Resources Ltd. announced that the company had signed an MOU with Gallant Minerals Ltd. to acquire up to an 80% interest in each of 20 gold and base-metal projects in Mongolia. Gallant owned and managed 38 exploration licenses that covered 188,000 hectares in Mongolia. Major projects included the Bayantsagaan gold project, which is located in the North Khentii gold belt 80 km northwest of Ulaanbaatar. The Nurag Uul gold project is located 100 km west of Dalandzadgad, Omnogobi Aimag, and 700 km south of Ulaanbaatar. The Zos Uul gold project is located approximately 100 km north of the Bayan Obo rare-earth mine in China and 700 km southeast of Ulaanbaatar. The Tsakhir copper-gold-molybdenum project is located 125 km from Dalandzadgad. The Toste Tl copper-gold project is located approximately 140 km north of Ejn Qi in China and 300 km southwest of Dalandzadgad (Solomon Resources Ltd., 2005).

The Government planned to privatize the state-owned Darkham Metallurgy Plant in Darkhan-Uul Aimag. The steel plant was operated under the 1994 intergovernmental agreement between Japan and Mongolia. In 2001, Mongolroostsvetmet Corp. won the management contract to run the plant. Since Mongolroostsvetmet took over the plant's management, the financial and operational

conditions of the plant have improved. The plant had a crude steel annual output capacity of 100,000 t using local steel scrap. The Parliament approved the Government's increase of the export tariff on scrap iron to \$297 per metric ton from \$119 per ton in 2004. The increase of export duty aimed to reduce scrap iron exports to China. Owing to the shortage of raw material, the Darkhan Metallurgy Plant operated below its output capacity, which resulted in a supply shortage of steel products to the domestic construction sector. Even with an increase of tariff rate, however, the supply of scrap iron remained tight because only one out of four exports was reported to the Customs General Office (Mongolia Development Gateway, 2004a\$, b\$).

Mongolrostsvetmet signed an agreement with Baotou Iron and Steel Group Co. Ltd. of Nei Mongol Autonomous Region, China, to exploit an iron deposit in Bargilt. Baotou will provide \$500,000 for the project, and mine construction will begin at the end of 2005. Bargilt Co. Ltd. was established to oversee the project (Mongolia Development Gateway, 2005a\$).

The construction of Tsairt Minerals' Tumurtiin Ovoo Mine near the town of Sukhe Bator, Sukbataar Aimag, began in October 2003 and was scheduled to be completed in August 2005. The mine was jointly owned by China Nonferrous Metal Industry Engineering Co. Ltd. (51%) and Mentalimpex of Mongolia (49%). The mine had 7.5 Mt of ore reserves with an average grade of 13.67% zinc. The open pit mine was designed to process 300,000 t of ore and could produce 66,000 t/yr of zinc in concentrates for 14 years. The construction cost was \$38 million (Mongolia Development Gateway, 2005c\$).

Mongolian coal output was mainly from mines at Aduun Chuluun, Baganuur, Sharyn Gol, and Shivee-Ovoo, which accounted for 90% of total production. Coal output had declined to about 5 Mt in the past several years from its peak of 8.6 Mt in 1988. The decline was caused by inadequate processing facilities, obsolete equipment and rail haulage system, and shortage of spare parts. During the past several years, the Government invested \$24 million to improve production conditions. The Government planned to privatize the Baganuur and the Shivee-Ovoo Mines (Mongolia Development Gateway, 2004c\$).

Ivanhoe announced that the company had discovered high-quality coal near the Nariin Sukhait Mine in Omnogobi Aimag on the property controlled by Ivanhoe in the South Gobi Desert; the mine is located approximately 40 km north of the Mongolia-China border. The deposit contains metallurgical and thermal coals. The Nariin Sukhait Mine was operated by the Sino-Mongolia joint venture Quing-Hua Mac Co. The mine had coal reserves of 125.5 Mt and was designed to produce 5 Mt/yr of coal, of which about 450,000 t/yr was coking coal. The coking coal was shipped by truck to Jiuquan Iron and Steel Co. in Gansu Province, China. China intended to build a 400-km-long railway from Jiuquan to the Mongolian border, which is 40 km south of the Nariin Sukhait project area. The railway would raise coal shipments to Jiuquan to about 2 Mt/yr. The Nariin Sukhait Mine lies within a small mineral lease surrounded by land controlled by Ivanhoe. Energoresource and Ivanhoe discussed joint development of the site. Energoresource held the license to the Tavan Tolgoi coal deposit that is located 140 km northwest of Oyu Tolgoi. Tavan Tolgoi could supply thermal coal for Ivanhoe's powerplant for the Oyu Tolgoi project. According to earlier data from the Soviet Union, the coal seam in the Nariin Sukhait Mine was up to 60 m thick and contains low ash and sulfur (Ivanhoe Mines Ltd., 2005).

The Tavan Tolgoi deposit is located about 90 km east of Dalanzadgad and 560 km south of Ulaanbaatar. Exploration work was first conducted in the 1950s. In 1998, BHP Ltd. of Australia acquired the exploration license; because of lack of infrastructure, however, the company decided not to pursue the development of the deposit and to cancel the exploration license. After that, a Canadian company also explored the area and concluded that mining would not be economically viable. Several Chinese companies also expressed interest in developing the deposit. In 2004, several Mongolian companies established Energoresource to acquire the exploration license. Hundreds of millions of dollars were needed to develop the deposit and Energoresource was looking for foreign investors to participate in developing the coal mine. The deposit was estimated to have 5 billion metric tons of high-quality coal (UB Post, 2005c\$).

Geologists had discovered that the geologic formations of the East Gobi and the Tamsag Basins in eastern Mongolia have many similarities with the Erlan and the Khailar Basins in China. Estimation of oil resources in Mongolia ranged between 4 billion and 6 billion barrels (Gbbbl). Recent studies showed that the Tamsag Basin had oil reserves of between 50 million barrels (Mbbbl) and 1.5 Gbbbl. SOCO International plc of the United Kingdom explored the contract block areas of XIX, XXI, and XXII in the Tamsag Basin. Dongsheng Petroleum of China and Roc Oil Co. of Australia jointly explored the contract block areas of XIII and XIV in the eastern Gobi Basin under a production-sharing contract (PSC). SOCO drilled four wells in area XIX. During the pilot production runs, wells 19-21 and 19-20 flowed at 120 barrels per day (bbl/d) and 70 bbl/d, respectively. Work on wells 19-22 and 19-23 will continue in 2005. Daqing Oil Co. (a subsidiary of China's leading oil producer PetroChina Ltd.) agreed to pay \$93 million to acquire SOCO's 85% interest in the PSCs for the Tamsag Basin, Mongolia. About \$40 million will be paid in cash, and \$53 million will be based on total crude oil production that will exceed 27.8 Mbbbl starting on January 1, 2005. Daqing planned to drill between 8 and 12 wells in the area (Petroleum Economist, 2004, 2005).

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## Major Source of Information

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Fax: 976-11-31-03-70  
E-mail: [mram@magicnet.mn](mailto:mram@magicnet.mn)  
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## Major Publications

National Statistical Office of Mongolia, Ulaanbaatar, Mongolia:  
Statistical Bulletin, monthly.  
Mongolian Statistical Yearbook, annual.

TABLE 1  
MONGOLIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2000	2001	2002	2003	2004 <sup>c</sup>
Cement, hydraulic thousand metric tons	92	68	148	162 <sup>r</sup>	170
Coal do.	5,185	5,141	5,307	5,666 <sup>r</sup>	6,800 <sup>3</sup>
Copper:					
Mine output, Cu content	125,227	133,503	131,705	130,270	130,000 <sup>3</sup>
Metal, refined	641	1,476	1,500	1,341 <sup>r</sup>	2,300 <sup>3</sup>
Fluorspar:					
Acid grade thousand metric tons	111	127	86	120 <sup>r</sup>	105
Submetallurgical and other grade do.	87	72	99	150 <sup>r</sup>	190
Total do.	198	199	185	270 <sup>r</sup>	295 <sup>3</sup>
Gold, mine output, Au content <sup>4</sup> kilograms	11,808	13,675	12,097	11,119 <sup>r</sup>	18,600 <sup>3</sup>
Gypsum <sup>c</sup> thousand metric tons	25	25	25	25	25
Lime, hydrated and quicklime do.	37	30	42 <sup>r</sup>	42 <sup>r</sup>	40
Molybdenum, mine output, Mo content	1,335	1,514	1,590	1,793	1,141 <sup>3</sup>
Petroleum, crude thousand 42-gallon barrels	65	74	139	183 <sup>r</sup>	190 <sup>3</sup>
Salt, mine output	1,293	1,800	1,268	1,971 <sup>r</sup>	2,000
Silver, mine output, Ag content <sup>c, 5</sup> kilograms	25,000	27,200	27,000	27,000	28,000
Steel, crude	13,000	10,000	15,900	39,300 <sup>r</sup>	40,000
Tungsten, mine output, W content	52	63	35	40 <sup>e</sup>	40

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits.

<sup>1</sup>Table includes data available through July 20, 2005.

<sup>2</sup>In addition to the commodities listed, crude construction materials, such as sand and gravel, and varieties of stones such as limestone and silica, are produced, but available information is inadequate to make reliable estimates of output levels.

<sup>3</sup>Reported figure.

<sup>4</sup>Reported raw gold production but excludes gold contained in copper concentrate.

<sup>5</sup>Based on 55 grams of silver per metric ton of copper concentrate.

Sources: National Statistical Office of Mongolia (Ulaanbaatar). Mongolian Statistical Yearbook 1999-2003. Mineral Resources Authority of Mongolia, Mining Office, Output of Mineral Commodities (Minerals Questionnaire 1999-2002).